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THE NEW ENGLAND BOTANICAL CLUB

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NOTES ON TRISETUM AND GRAPHEPHORUM.

F. Lamson-Scribner.

The limitations of the larger genera of the tribe *Aveneae* are in no case clearly defined, and the classification of many of the species will always be determined with more or less doubt, resting finally upon the judgment of the agrostologist, rather than upon any definite characters. Some of the smaller genera in the tribe are established upon purely technical or artificial characters subject to more or less individual variation, and at best of questionable taxonomic value. Such are *Aira, Graphephorum,* and *Ventenata,* while one has only to consult the synonymy of the species of *Avena, Deschampsia* and *Trisetum* to discover how varied have been the views concerning them, species resting for a time in one genus only to be shifted by a later author to another, until some have figured for a season in three or even more recognized genera. Botanists have repeatedly attempted to fix upon characters which would sharply outline a genus, and in some cases have sought to attain this result by establishing new genera. *Deschampsia, Danthonia* and *Trisetum* were thus segregated from *Aira* and *Avena,* but with the advancement of our knowledge through the investigation of more abundant material and discovery of "new" species, the generic limits have been broken here and there until we are forced to admit the futility of the attempt, accepting the fact that the different groups or divisions of organic life even to the ultimate specific units, however natural they may appear, present variations which, in one way or another, so connect them together that they present a unity of development wherein genera and species become simply the expressions of the scientist, merely serving to facilitate his efforts in studying the grand scheme of nature.

Specific characters, or those used to define species, are no less variable than the generic, and it is the purpose of this paper to call attention to some of these in a few of our native grasses concerning whose classification there has been some diversity of opinion. A brief discussion of the genera included is necessary to the presentation of the subject.

Trisetum.— Persoon, in 1805, segregated from *Avena* a number of species upon which he founded the genus *Trisetum* with the following characters: "*Cal.* 2-3-florus, acuminatus, carinatus. *Cor.* aristis 2 terminalibus subdentiformibus (glum. apice setoso-bifidis), 1 dorsali recta nec contorta, flosc. ut plurimum glabris. (*Spiculae* compressae, pallescentes.)"[1] The bidentate flowering glumes straight, not twisted, dorsal awns and compressed spikelets were apparently the differential characters. Persoon evidently had some doubts as to the limitations of his genus, for he concludes his enumeration of the species by the observation: "Nonnullae generis *Avenae* species ex. gr. Av. pensylvanica, lupulina et purpurea huc quoque pertinere videntur, quae ulterius examen hinc merentur." *Trisetum palustre* he leaves in *Avena*. Eleven species make up the genus, six of which are now referred to other genera; one, the first described, to *Ventenata*; two to *Danthonia*; and three to *Avena*. The fourth species described, *T. nitidum* Pers., is still retained in the genus, and being the first species for which a figure is cited, must be accepted, according to the opinion of some taxonomists, as the type of the genus.

Seven years later, in 1812, Beauvois[2] takes up *Trisetum*, increasing the number of species to eighteen, only half of which, according to the Kew Index, are now retained in the genus; *Ventenata*, *Danthonia*, *Aira*, and *Avena* claiming seven while two are merely synonyms. It may be of interest to note here that the *Trisetum subspicatum* is the *Aira subspicata* of Linnaeus[3] but was published six years earlier by the same author under *Aira spicata* (Linn. Sp. Pl. **1**: 64. 1753),[4] the name taken up by Richter in 1890 (Richt. Pl. Eu. **1**: 59.) Beauvois apparently had a very clear conception of the genus as it is understood today, and his failure to apply properly his diagnosis, shown by his rather heterogeneous assemblage of species, only seems to

[1] Pers. Syn. **1**: 97. 1805.
[2] Agros. 88, Pl. 18, fig. 1.
[3] Syst. Nat. ed. 10. **2**: 873. 1759.
[4] *Aira spicata* on page 63 of Species Plantarum was changed by Linnaeus in the errata to *Aira indica*.

emphasize the fact already noted, that the element of opinion or judgment plays no small part in the deductions of the keenest observers. That Beauvois was an acute observer of rare judgment his work amply shows, and his diagnosis of *Trisetum*, here quoted, presents all the essential characters embodied in the more pretentious efforts of recent authors. "Axis paniculatus: Panicula composita.— Glumae membranaceae, 3–5-florae, longitudine flosculorum: Palea infer. *biseta, dorso supra medium aristata*: *Arista herbacea, flexuosa, raro plicata.*" He separates *Danthonia* and *Avena* from *Trisetum* by the character of the awn, which in these genera he describes as being plicate and twisted, while *Deschampsia* has the apex of the flowering glume multidentate, with the slender awn inserted near its base. He makes no mention of the relationship of the genus with *Eatonia, Koeleria*, or *Deyeuxia*, and fails to recognize the genus *Ventenata*, published by Koeler (Desc. Gram. 272, 1802).

Beauvois separates *Graphephorum* chiefly by the shortness of the awn: "paleae bifido-dentatae: infer. inter dentes mucronata." Hairiness of the rachilla is common to most species of *Trisetum*, and there are both North and South American species in which the awns are very short or even suppressed entirely. Desvaux (Gay, Flor. Chil. **6**: 352, 1853) forms a section in the genus, Sect. *Koeleria*, to include the species in which the awns are straight, usually short, or sometimes wanting. He includes in this section *Trisetum micratherum* and *T. subaristatum*. Grisebach (In Abhandl. Gesellsch. Wiss. Goett. **24**: 292, 1879) transfers *T. micratherum* Desv. to *Koeleria*. I have seen the grass referred by Philippi (Ann. Univ. Chil. **43**: 568, 1873) to this species, and would retain it in *Trisetum*. It is distinguished from *Koeleria* by its decidedly unequal empty glumes, bearded callus and rachilla, and short subterminal awns. The texture and character of the glumes are like those of *T. Wolfii* Vasey, and the inflorescence is much the same as in that species. Philippi (Ann. Univ. Chil. **94**: 26, 1896) refers his *Trisetum minutiflorum* to the same section—(*Koeleriae*), but this grass is not referable to *Trisetum*. It belongs to the section *Lophochloa* of *Koeleria*, being most closely allied to *K. phleoides* and *K. villosa* Pers.

Trinius (Fund. Agros. 157, 1820.) unites *Trisetum* with *Avena*, but later (Mém. Acad. St. Pétersb. VI, **1**: 59, 1830) he takes up the genus and in his diagnosis describes the flowering glume as "bidentate vel bisubulate, dorso arista vel infra apicem setigera (rarissime mutica)."

He divides the genus into three sections; those species having "perianthiis bidentatis, aristis (setis) abbreviatis" form his section "b," to which he refers *Koeleria villosa* and *K. phleoides* Pers. The third section, which is established with a query, has the flowering glumes awnless. Here he includes *Eatonia obtusata* (Mx.) A. Gray and *E. pennsylvanica* (D.C.) A. Gray, with the remark that the latter is similar to *Trisetum palustre*. It is clear that Trinius recognized the close relationship of *Eatonia* and *Koeleria* with *Trisetum* by uniting these genera with it, although he apparently excluded them a few years later when he published (Mém. Acad. St. Pétersb. VI. **4**^{2}: 10–11, 1836) a more complete diagnosis of the genus, evidently the result of much careful study. He does not appear to have made any reference to *Graphephorum melicoideum*, at least I have failed to discover any, but this grass would certainly fall under *Trisetum* as above characterized.

Graphephorum:—In a memoir upon some new genera of Gramineae published in 1810 (Nov. Bull. Soc. Philom. de Paris, II. **2**: 189) Desvaux established the genus *Graphephorum* upon Michaux's *Aira melicoides*, published in 1803 (Flor. Bor. Am. **1**: 62). Michaux describes his plant as follows:

"A. erecta, glabra, planifolia: panicula parvula, subracematim coarctata: gluma communi partialibusque majusculis, lineari-lanceolatis, muticis; his basi villis cinctis: minutissimo tertii flosculi rudimento pedicellato.

"Obs. Ex secundi flosculi basi nascitur pedicellus longiusculus, villosus, vix perceptibili floris rudimento terminatus.

"Hab. Canada."

Desvaux evidently examined specimens of the grass, probably Michaux's, for he adds some characters in his diagnosis not noted by the author of the species.

"*Graphephorum.* Gluma biflora valvulae acutae integerrimae; glumellae inclusae; valvulae bifidae, appendix interflorus, elongatus, pilosus, pilis secundis. Spiculae paniculatae.

"Graphephorum melicoideum Desv.

"Aira melicoides Michx.

"L'appendice qui characterise ce genre, ne ressemble point à une fleur avortée, c'est un corps tout particulier."

He does not compare *Graphephorum* with *Trisetum*, but separates it from *Aira* by the peculiar character of the prolongation of the

rachilla, which he makes the essential character of his new genus, placing it with *Triodia*.

Beauvois in 1812 recognizes *Graphephorum*, and adds a little to the generic characters without increasing the number of species. He says (Agros. 76): "Flosc. suprem. pedicellato, abortivo, villosissimo.—Paleae bifido-dentatae: infer. inter dentes mucronata." He evidently looked upon the hairy prolongation of the rachilla as an aborted floret, and his specimens showed the minute awn below the teeth of the flowering glume, which character was not manifest in the material examined by Michaux and Desvaux, or was overlooked by them, but which is nevertheless common, the awn often being quite conspicuous.

In 1856, Dr. Asa Gray published (Man. ed. **2**: 556) as new a form of *Aira melicoides* Mich. under the genus *Dupontia*, naming it *D. Cooleyi* and comparing it with *Aira caespitosa* and *Aira bothnica*. Later, having discovered the relation of his grass with Michaux's *Aira melicoides*, *Graphephorum melicoideum* of Desvaux, he revised the genus *Graphephorum* (Annal. Bot. Soc. Canada, **1**[1]: 55–57, 1861) modifying its characters so as to include the species of *Scolochloa*, *Dupontia*, and *Colpodium*, reducing his *Dupontia Cooleyi* to a variety of *Graphephorum melicoides*, characterizing it as "a luxuriant form from 2 to 3 feet high with ampler panicles."

There is in the Gray Herbarium a specimen collected by Dr. Cooley in Macomb Co., Michigan, which is doubtless the type of this variety, and in its robust habit and pilose leaves, Gray very naturally failed at first to connect it with the more slender and glabrous plant described by Michaux. This specimen has scabrous leaves which are pilose upon the upper surface, spikelets 6–7 mm. long, unequal empty glumes, the broad 3-nerved second glume nearly equalling the spikelet and the oblong obtuse flowering glumes, which are entirely awnless. The rather stiff hairs on the rachilla are about 1.5 mm. long. This variety is exactly represented in the National Herbarium by 26,222 *J. Macoun*, from Johnston's Harbor, Lake Huron, collected in 1901.

Both Hackel (Engl. & Pr. Naturl. Pflanzenf. **2**[2]: 74, 1887) and Baillon (Hist. d. Plant. **12**: 212, 1894) hold *Graphephorum* as a genus distinct from *Dupontia*, *Scolochloa*, and *Colpodium*; but regard it as being closely allied to them, placing it with them in the *Festuceae*. This disposition appears to be wholly unwarranted, for there is nothing in common between *Graphephorum* and the genera above named excepting the hairiness about the base of the flowering glume, while there

are striking features suggesting relationship with the *Aveneae* as indicated by the earlier authors. The habit of the plant, the character of the inflorescence, the texture and nervation of the glumes, the inequality and length of the outer ones, the hairiness of the rachilla, and the occasional presence of an awn below the apex of the floral glumes all point to a close relationship with *Trisetum*. The entire absence of the awn in the specimens first described has been the stumbling block apparently, leading various authors to erroneous conclusions. As already noted, the reduction of the awn in length sometimes to a mere mucronate point or even its entire suppression is not uncommon among the *Aveneae*. In *Avena*, the cultivated oat is often awnless; the awns are very variable in *Deschampsia caespitosa*; in *Trisetum filifolia* Scribn. the awns are very short (less than 1 mm.), while in *T. filifolium pubescens* they are well developed (3–4 mm.); *T. muticum* (Thurb.) Scribn. has both short-awned and awnless spikelets; while in *T. montanum* Vasey short-awned forms also occur.

At the Philadelphia meeting of the A. A. A. S. in 1884, Dr. Vasey presented a paper in which he pointed out the close relationship of *Eatonia* with *Trisetum*, concluding with the statement "that *Eatonia* and *Trisetum* are very closely related, and should both be in the section *Avenaceae*, as also should some species of the genus *Graphephorum*." (Bot. Gaz. **9**: 167. 1884) The species of *Graphephorum* referred to by Dr. Vasey were *G. melicoideum* Desv. and *G. Wolfii* Vasey. The relationship of these with *Trisetum* was discussed by the present writer at the same meeting, and published in connection with Dr. Vasey's communication. (Bot. Gaz. l. c. figs. 4–5) The writer here says, quoting a letter from Dr. Vasey: "*Graphephorum melicoides* should be *Trisetum melicoides*; or if a genus (*Graphephorum*) be made for it, it should come next to *Trisetum* or *Avena*, for it is evidently Avenaceous." Here we have the first definite reference of *Graphephorum melicoideum* to *Trisetum*. More recent investigations and present very careful study of the entire subject, aided by the ample material in the National Herbarium, have only served to establish more firmly the conclusions set forth by Dr. Vasey.

Trisetum melicoideum (Michx.) Vasey, Bot. Gaz. **9**: 169, 1894; *Aira melicoides* Michx. Flor. Bor. Am. **1**: 62, 1803; *Graphephorum melicoideum* Desv. Nouv. Bull. Soc. Philom. **2**: 189, 1810; Beauv. Agrost. 76, *Pl. 15, fig. 8*, 1812; Scribn. U. S. Dept. Agr. Div. Agros. Bul. 20, fig. 121, 1900.

A slender glabrous perennial, with flat leaves and open nodding panicles 10–12 cm. long. Spikelets 2–3-flowered, about 6 mm. long, with unequal empty glumes, the broader 3-nerved second glumes about equalling the florets; flowering glumes narrow, oblong, obtuse or imperfectly 2-lobed or 2-toothed, awnless or with a very short awn just below the apex (see figures above cited); paleae about ¼ shorter than the glume, hyaline; callus and joints of the rachilla hairy, the hairs on the rachilla, at least the upper ones, 1.5 to 2 mm. long.

Specimens examined: Mt. Kineo, Maine, *C. E. & A. H. Smith*, 1868; St. Anne des Monts River, Quebec, *O. D. Allen*, 1881; Madeleine River, Quebec, *J. Macoun*, 1882.

Trisetum melicoideum Cooleyi (Gray) Scribn. n. comb.; *Dupontia Cooleyi* A. Gray, Man. ed. **2**: 556, 1856; *Graphephorum melicoides major* A. Gray, Annals Bot. Soc. Can. **1**:[1] 57, 1861; *G. melicoides Cooleyi* Scribn. Mem. Torr. Bot. Club, **5**: 53, 1894.

Lower sheaths pubescent, upper surface of the leaves pilose; flowering glumes 5–6 mm. long, minutely punctate-scabrous, entire at the acute apex, awnless. Otherwise as in the species.

Specimens in the National Herbarium: Orion, Michigan, no. 882, *O. A. Farwell*, 1895; Flint, Michigan, *D. Clark*; Winooski River, Vermont, *C. G. Pringle*, 1877; St. Francis, Maine, no. 187, *M. L. Fernald*, 1893; Western Vermont, no. 1753, *L. R. Jones*, 1899; Gault, Ontario, no. 54, *Wm. Harriot*, 1901; Canada, no. 131, *J. Macoun*, 1871. Shores Lake Huron, Canada, no. 26,222, *J. Macoun*, 1901; Rocky Banks, Lake Huron, *Macoun*, July, 1874.

In the specimen last mentioned the spikelets are 3- to 4-flowered and 9 mm. long; the callus hairs 1–2 mm. long, soft and lax.

A glabrous form from Vermont, collected by Mr. C. G. Pringle in 1876, connects the variety with the species. It has the elongated lower leaves and entire flowering glumes in which the midnerve is sometimes excurrent just below the minutely toothed apex.

Trisetum Wolfii Vasey, Monthly Report U. S. Dept. Agr. Mar. 156, 1874; Bot. Wheeler Expedition **7**: 294, *Pl. 27, fig. 1, 2, 3*, 1878; *Graphephorum Wolfii* Vasey in Coulter Man. Rocky Mt. Bot. 423, 1885.

A rather slender caespitose perennial, with glabrous culms, flat leaves, and contracted usually densely flowered panicles 10 to 20 cm. long. Sheaths and leaves glabrous or pubescent, varying to pilose. Spikelets 2–3-flowered, 5–7 mm. long, slightly compressed; empty glumes subequal in length, broadly lanceolate, acute, scabrous on the

keel above, the first 1-nerved, the second a little broader and 3-nerved; flowering glumes oblong, minutely erose, dentate at the rounded or imperfectly 2-lobed apex, the first 5 to 6 mm. long, awned on the back a little below the apex or awnless. Palea nearly as long as the glume. Callus and rachilla bearded, hairs short. Awn when present rarely extending beyond the apex of the glume, but varying in length from .5 to 3.0 mm.

Colorado, Idaho, Washington, Oregon, and California. Type locality, Twin Lakes, Colorado.

The typical form of this species, which does not extend west of the Rocky Mountains, is glabrous throughout. It is represented in the National Herbarium by the following specimens: Colorado, no. 693, *Geo. Vasey*, 1868; no. 668, *Hall & Harbour*, 1873; no. 333, *F. E. Clements*, 1896; no. 180, *C. F. Baker*, 1899; no. 1063, *C. L. Shear*, 1896; nos. 1449, 1482, *Shear & Bessey*, 1898; Wyoming, nos. 4013, 4012, *Aven Nelson*, 1897; no. 455, *E. Nelson*, 1901; no. 2617, *T. A. Williams*, 1897; no. 7787, *Aven Nelson*, 1900. Montana, no. 493, *C. L. Shear*, 1905; Utah, no. 4292, *Pammel & Backwood*, 1902.

Trisetum Wolfii muticum (Thurb.) Scribner, n. comb.

Trisetum subspicatum muticum Thurb. in Brew. & S. Wats. Bot. Calif. **2**: 296, 1880; *T. muticum* Scribn. U. S. Dept. Agr. Div. Agros. Bul. **11**: 50, *fig. 10*, 1898.

Sheaths pubescent, often quite densely so, with downwardly directed hairs, leaves pubescent or pilose only upon the upper surface. California, no. 5019, *Bolander*, 1866; Oregon, no. 1314, *W. C. Cusick*, 1886; no. 2333, *Cusick*, 1899; no. 147, *Griffiths & Hunter*, 1902; Washington, no. 949, *W. N. Suksdorf*, 1889; no. 101, *Suksdorf*, 1884; Montana, no. 370, *F. Lamson-Scribner*, 1883; no. 573, *R. S. Williams*, 1890; no. 3080, *P. A. Rydberg*, 1896; Idaho, no. 435, *Heller, Sandberg & McDougal*, 1892; no. 1049, *J. B. Leiberg*, 1895, panicles unusually lax; no. 2812, *C. V. Piper*, 1898 (specimen in Gray Herb.).

Specimens with the lower sheaths finely scabro-pubescent occur throughout the range of the species, connecting the pubescent with the glabrous forms.

The spikelets of *T. Wolfii* are less compressed and the glumes are somewhat firmer in texture than in *T. spicatum molle*, from any form of which it is readily separated by its subequal empty glumes. This latter character, together with the narrower, elongated and densely flowered panicles, at once distinguish *Trisetum Wolfii* from any form

of *T. melicoideum*. From the more nearly allied **Trisetum altijugum** Scribn. n. comb. (*Graphephorum altijugum* Fourn.) by its larger panicles and spikelets which are about 4 mm. long. The panicle of *T. altijugum* resembles that of *Sporobolus indicus*.

Trisetum montanum Vasey, Bull. Torr. Bot. Club, *13*: 118, 1886; *T. alpestre* Vasey, Bot. Wheeler Exped. **6**: 294, *Pl. 27, fig. 4, 5, 6*, 1878—not *T. alpestre* Beauv. 1812; *Trisetum Shearii* Scribn. U. S. Dept. Agr. Div. Agros. Circ. **30**: 8, 1901; *Graphephorum Shearii* Rydb. Bull. Torr. Bot. Club, **32**: 602, 1905.

Dr. Vasey at first referred this grass to the European *Trisetum alpestre*; later he noted its close relationship with *T. flavescens*, and he says (MS. notes in National Herbarium): "much like *T. flavescens*, but wanting in the color; the leaves are much longer, the spikelets are smaller, the flowering glumes much more acuminate, the awns shorter and less twisted." The specimens of the Wheeler Expedition (no. 669, *J. Wolfe*) are about 2.5 dm. high, with rather densely flowered panicles 6–8 cm. long. Robust specimens 6–10 dm. high, with more open panicles 10 to 20 cm. long, are represented in the National Herbarium from Idaho Falls, no. 720, *C. L. Shear*, and nos. 2481, 2484, 2491, *P. A. Rydberg*, 1895. It is difficult to separate these from *T. flavescens*, the most obvious difference being in the awn, which is straight or simply divergent in *T. montanum*, while in *T. flavescens* it is twisted below and distinctly geniculate. The glumes, especially the flowering ones, are a very little broader in the last named species.

The lower sheaths and leaves vary from being entirely glabrous to pilose or pubescent, as in no. 2479, *P. A. Rydberg*, and no. 718, *C. L. Shear*, 1895, both from Idaho Springs. Other specimens with the lowermost sheaths pubescent come from Las Vegas, New Mexico, collected by *G. R. Vasey*, and from Garland, Colorado, no. 71, *C. L. Shear*, 1900. Variations in the length of the awn occurs in this as in other species of *Trisetum*, and the color varies from pale silvery green to purplish shades, the shortening of the awn occurring in the latter, being especially manifest in no. 1214, *C. L. Shear*, from Silverton, Colorado, specimens that were at first regarded as representing a distinct species (*T. Shearii* Scribn.). Other specimens showing intermediate characters occur connecting the short-awned forms with the longer awned types.

The distribution of *Trisetum montanum* appears to be limited to the mountain regions of Colorado and New Mexico.

Washington, D. C.

SOME ANOMALOUS PLANTS OF TIARELLA AND MITELLA.

M. L. Fernald.

The occurrence, at least in the wild state, of inter-generic hybrids is so unusual that the following instances of what seem with little question to be hybrids between *Tiarella cordifolia* and species of *Mitella* are worthy special record and closer observation in the field.

My attention was recently called to the existence of these plants by the receipt from Mr. J. M. Macoun of a sheet of specimens collected by his father, Professor John Macoun, on rocks in a ravine near Eel River, New Brunswick, on August 29, 1899. The plant which suggested to Professor Macoun the long-lost, and never rediscovered, *Mitella prostrata* described by Michaux from Lake Champlain, is in aspect like a freely stoloniferous plant of *M. nuda*, in the rounded lobes of the leaves and the very slender stolons inseparable from that plant. Its inflorescences, borne irregularly at the tips of the leafy flagelliform stolons are quite unlike those of *M. nuda*, but in their short oblong outline suggest the racemes of *Tiarella cordifolia*. The flowers, too, are structurally similar to those of Tiarella: the petaloid calyx free from the subulate capsules which vary from 1 to 3 and are apparently quite empty and inclined to shrivel without enlarging; the petals when present linear-spatulate and entire or ciliate-margined, rarely exceeding the sepals; the stamens as in *Tiarella*, and varying from 5 to 10. The stolons bear numerous reddish deeply lacerate stipules which sometimes subtend normal leaves, and again bear in their axils minute subulate bodies resembling the pistils of the racemose flowers; and in the racemes many of the flowers are subtended by the conspicuous ciliate-fimbriate bracts which are much larger and more freely cleft than the bracts in normal *Tiarella*.

From the above description it will be seen that the Eel River plant is aberrant in many regards. With the habit of *Mitella nuda*, it has flowers which structurally suggest *Tiarella cordifolia*, though the petals are sometimes ciliate, a character which suggests the fimbriate petals of *Mitella*. The sterility of the plant, and its eccentric habit of flowering from the tips of the stolons at the end of August, instead of in early summer when both *Mitella nuda* and *Tiarella cordifolia* are normally

in anthesis,[1] indicates, in connection with its other characters, that the anomalous plant from Eel River is a probable hybrid between those two species, both of which abound in the St. John Valley.

Another plant which seems to be a hybrid of *Tiarella cordifolia* and a species of *Mitella* was noted by Dr. Gray[2] in 1886, although that fact seems to have been overlooked in two recent extended publications on the North American *Saxifragaceae*,[3] where another probable hybrid, between *Mitella diphylla* and *M. nuda*, is recognized by both authors, by Dr. Rydberg as *M. intermedia* Bruhin; by Dr. Rosendahl as *M. diphylla*, forma *intermedia*, with the suggestion as already made by Mr. Bruhin in a letter to Dr. Gray that the plant is a hybrid. The plant referred to by Dr. Gray in the Bulletin of the Torrey Botanical Club has the aspect of a small-flowered *Tiarella* with unusually rounded leaves, and the small petals are more or less lacerated. This plant which was thought by Dr. Gray to be a possible hybrid of *Tiarella cordifolia* and *Mitella diphylla* is represented by two sheets in the Gray Herbarium, one from Williamstown, Massachusetts (coll. *Sanborn Tenney*), the other from Wilton, New Hampshire (coll. *M. A. C. Livermore*).

Since the parents of these supposed hybrids are all common in many portions of New England and eastern Canada it is hoped that the above notes will stimulate those who have opportunity to watch them in the field to observe whether this tendency to inter-generic hybrids is more common than we suppose, and, more important still, whether these plants, as seems to be the case, are always sterile.

Another plant which should be sought by northeastern botanists is *Mitella prostrata* Michx. discovered by Michaux more than a century ago near Lake Champlain, but so far as we know not since detected. This was originally described as

M. "PROSTRATA. M. radice repente; caulibus prostratis, alterne foliosis; foliis rotundato-cordatis, subacutis, obtuse sublobatis.

Hab. ad fines meridionales Canadae."[4]

This plant was taken by Torrey and Gray to be a peculiar extreme

[1] *Tiarella cordifolia* flowers regularly in late spring and early summer, and rarely if ever produces autumnal flowers. *Mitella nuda*, on the other hand, is inclined to produce flowers somewhat erratically throughout the summer and autumn, though its season of profuse blooming is in late spring and early summer.

[2] A. Gray, Bull. Torr. Bot. Cl. xiii, 85 (as insert), 100 (1886).

[3] Rydberg, N. A. Fl. xxii. pt. 2, (1905); Rosendahl in Engler, Bot. Jahrb. xxxvii. Beibl. 83 (1905).

[4] Michx. Fl. i. 270 (1803).

of *M. nuda*: "β. creeping shoots assurgent at the extremity, bearing a terminal raceme";[1] and subsequent authors have very generally considered the plant a phase of *M. nuda*, while both Doctors Rydberg and Rosendahl in their monographs reduce it to unquestioned synonymy as identical with that well-known northern species.

Michaux's specimen at the Muséum d' Histoire Naturelle in Paris, however, shows that, while the plant is an undoubted *Mitella*, it is far from identical with *M. nuda*. The sheet, bearing besides analytical notes the inscription in Michaux's hand "*Mitella prostrata.* Lac Champlain," shows a plant as coarse as *M. diphylla*, with a thickish subterranean creeping rhizome, but no slender stolons as in *M. nuda*; the leaves strongly angulate-lobed as in *M. diphylla*; and the ascending flowering-stem 3.6 dm. high (taller than most *M. diphylla*) and bearing 4 very remote alternate leaves, the two lower strongly angled and long-petioled, the two upper scarcely angled and subsessile. The raceme is very long-peduncled (6 cm. long), though a remote solitary flower is borne from the axil of the uppermost leaf. In general the inflorescence suggests that of *M. diphylla*, but the pedicels, 3–6 mm. long, are much longer than in that species, in which they are normally from 1.5 to 2.5 mm. long. In these rather long pedicels alone does the Michaux specimen of *M. prostrata* approach the more slender round-leaved scapose *M. nuda* to which it has too long been referred; but in the long pedicels as well as in its remote alternate leaves it strongly suggests Nuttall's *M. caulescens* of the Northwest. That clearly-marked species, however, has the pedicels strongly divergent while those of *M. prostrata* are as strongly ascending.

This detailed account of Michaux's original specimen of *Mitella prostrata* is here included not because, as in the case of the first two plants discussed in these notes, it is an apparent hybrid, but because it is evidently a lost species. Whether it is a plant genetically distinct from both the well-known eastern species it is now impossible to say; but the definition of the type-region, "ad fines meridionales Canadae," supplemented by Michaux's manuscript record "Lac Champlain," is sufficiently clear; and the Champlain Valley is being explored by botanists too keen and discriminating to overlook *Mitella prostrata* if, as in Michaux's day, it still grows near the border of Vermont.

Gray Herbarium.

[1] T. & G., Fl. i. 586 (1840).

SOME NOTES ON OUR YELLOW CYPRIPEDIUMS.

Ora W. Knight.

Though the extreme forms of our native yellow Cypripediums have been recognized as species under the names *Cypripedium pubescens* Willd. (Sp. Pl. **4**: 143. 1805) and *C. parviflorum* Salisb. (Trans. Linn. Soc. **1**: 77. 1791) I have long doubted their specific distinctness. Study of the plants growing in the field and also of some under cultivation in the garden would seem to prove that we have at best a species, *C. parviflorum Salisb.*, which would appear to be our small flowered plant which has commonly passed under this name, while the larger flowered form would appear to require the name, *Cypripedium parviflorum* var. **pubescens**, in order that its exact relationship be better expressed.

On May 30, 1901, Mr. F. M. Billings found a clump bearing eleven flowering stalks which could be referred under the descriptions in the current manuals to no other species than *Cypripedium pubescens*. They agreed perfectly with the descriptions in size of flower, compression of lip, shape of foliage and all the characters except color of the blossoms which were bright, not pale yellow. These plants were growing in very rich soil in low shady woods. A portion of the plant was pressed and three flowers from it are now in my herbarium. Mr. Billings transplanted part of the cluster into his garden, putting them into less rich soil and in a sunnier spot than where they naturally grew. In 1905 the characters of these plants were so far changed that they would pass very well for the small-flowered plant, *Cypripedium parviflorum*. The whole plant had become shorter and slenderer with narrower foliage, the lips of the flowers less than an inch in length (some were two inches at time when transplanted), lips not appreciably flattened laterally and in fact not any longer possessing the characters of the large-flowered plant.

During the past few years I have annually transplanted into my garden clumps of a plant which agreed in all essential characters with the *Cypripedium parviflorum* of the manuals, save that in most instances the blossoms were pale yellow, not bright yellow, as called for by the descriptions, but some plants had bright yellow blossoms though not otherwise differing. The plants longest growing in the garden (about five years) have increased in size, have larger broader foliage, flowers with lips up to one and three-quarters inches long which are deeper

yellow colored; and in fact many have the essential characters of what has passed as *C. pubescens*, while others not so long in the garden do not show quite so great a change. My plants were originally growing in moss in a cold bog, and did not blossom until past the middle of June, many not until the first of July. I transplanted them into very rich soil in a sunny locality, and now the earliest bloom sometimes by the third week in May, and even plants which were transplanted the year before are in bloom by June first. All the plants bear increased numbers of flowering stalks, and nearly all the stalks bear two flowers where originally it was very rare to find more than one on a stalk. One season two stalks from the same plant bore flowers whose lip on one stalk was laterally compressed while on the other it was strongly compressed from above, there being one flower on each of these stalks.

While studying the plants in their natural habitat in Maine I have repeatedly found many which were intermediate in characters between *Cypripedium parviflorum* and *C. pubescens* and in most instances plants readily referable to one or the other form (sometimes both forms) were growing with these intermediates. In both the large-flowered and small-flowered plants I have seen flowers both pale yellow and deep yellow; both with fragrant and odorless flowers, some with ovate sepals, others with elongated lanceolate ones; some broad-leaved, others narrow leaved; some with sepals and petals decidedly brownish-purple, others not so; in fact almost every combination of characters.

The dwarf, small-flowered plant of the Rocky Mountain region which is sometimes not more than six inches high and with lip not more than half an inch in length seems very distinct from either of ours until some essential character besides size is sought for, at which stage there seems to be no other differential characters. Taking the two plants as found in the East, the extremes seem very different; but the characters given in the manuals do not hold good for each form. Even Gray's Manual, 6th ed., p. 511, states at the end of the description of *C. parviflorum*,—"Flowers fragrant; sepals and petals more brown-purple than in the next, [referring to *C. pubescens*] *into which it seems to pass*" (italics mine).

The characters ordinarily given in descriptions fail to serve as an absolute means of separation of the two plants, and unless the numerous specimens possessing characters of both forms can be accounted for on the grounds of hybridism we ought to regard them as different phases of the same species.

Bangor, Maine.

TWO NEW SPECIES OF RUBUS FROM VERMONT AND NEW HAMPSHIRE.

W. H. Blanchard.

Of the new species of Rubus, here described, both belong to the high blackberry series. The first is a rather small and delicate species, glabrous and glandless, with dark green leaves, small, early fruit, and slender, strong, and often numerous prickles. The second is noteworthy for its large and abundant fruit which is of excellent flavor. The species may be characterized as follows:—

Rubus elegantulus, n. sp. Plants from two to four feet high, very erect and pretty.

New canes. Stems very erect, 2 to 4 feet high, glabrous, red, well angled and furrowed, rather small. Prickles on the angles only, slender with a slight backward slant, strong and waspish to handle, about 12 to the inch of stem on typical plants but often less. Leaves thin, small, 5-foliate, dark green above and slightly lighter below, perfectly glabrous, or sometimes slightly hairy above and pubescent below, but not appreciably so to the touch or to the unaided eye. Leaflets oval, long taper-pointed; outline entire, finely and doubly serrate-dentate, the middle one rather broad with rounded base and twice as long as wide, the others wedge-shaped at the base and narrow. Petiole and petiolules grooved above with three rows of hooked, slender, short and strong prickles, the petiolule of the middle leaflet $\frac{3}{4}$ of an inch long, those of the side leaflets less than half as long, the basal leaflets sessile.

Old canes. Erect as ever, prickles but little impaired, the cane pyramidal in shape as in all true high blackberries. Growth of second or bearing year consisting of leafy branches below; above of racemes leafy at the base with a straight axis, not a leafy branch tipped with a raceme, one from each old leaf axil, or in many cases from two to four leafless racemes. Inflorescence with a fine pubescence or none; peduncle slender, pedicels very slender generally set at a great angle to the axis, 10- to 16-flowered, bracts small. True branches small, 6 to 10 in. long, zigzag, nearly terete, glabrous, prickles hooked; leaves 3-foliate at the base, leaflets broad and short-pointed; terminal ones 5-foliate like those on new canes, all similar in color, texture and serration to those on new canes. Leaves on racemes proper more coarsely serrate-

dentate, 3-foliate, a few sometimes unifoliate, small on the upper ones, larger on those below. Flowers 1 to 1½ in. broad, petals long-oval at least twice as long as wide with no apparent claw. Fruit nearly globular, ¼ to ⅜ in. in diameter, or on strong plants cylindric and larger, sweet, drupelets black and rather larger than those of *R. nigrobaccus*, Bailey. Flowers early in June and fruits early in August, productive.

Type stations: Signal Hill and its northern borders in Alstead, Cheshire County, N. H., being midway between Alstead Center and Beryl Mt., Acworth; Thompsonburg in Londonderry, Athens, Stratton and Windham in Windham County, Vt. Range as now known to me; Southwestern New Hampshire and Southeastern Vermont. Elevated situations in open places on dry ground. Numerous specimens have been deposited by me in the Gray Herbarium and in that of the N. Y. Botanical Garden.

This pretty species which seems to be distinct from anything yet described, I first found July 4, 1902, in Athens, Vt., on Bemis Hill and I have watched it each season since. It grows in elevated situations not occurring in the towns bordering on the Connecticut River. To be specific, I have found it often abundant in Athens, Grafton, Jamaica Londonderry, Stratton, Wardsboro and Windham, Vt., and in Acworth, Alstead and Langdon, N. H., an east and west range of forty miles. It blossoms and fruits the earliest of all blackberries in the localities in which it grows.

It is readily distinguishable from the other high blackberries by its prim appearance, early fruiting and numerous slender prickles; from the recurving class by its narrow leaflets and erect and furrowed stem; and from the *setosus* class by its strong prickles, lack of glandular hairs and all the other characteristics mentioned in this paragraph.

Rubus pergratus, n. sp. Large, erect plants more or less pubescent, and nearly, or quite glandless, producing an abundance of large, short-cylindrical, very edible fruit.

New canes. Stems erect, 3 to 6 feet high, large and strong, red and glabrous, angled and furrowed. Prickles few, short, about ⅛ in. long, strong, stout, 2 to 8 to the inch of stem, set at nearly a right angle to it and on its angles only. Leaves of good size, often large, 5-foliate, dark yellow-green and nearly glabrous on the upper surface, lighter on the lower surface and pubescent. Leaves long-stalked, oval, often broad-oval, the middle one sometimes ovate or nearly orbicular and a trifle cordate, outline entire, finely often doubly serrate or serrate-

dentate, taper-pointed, rounded at the base or the basal leaflets broadly wedge-shaped. Petiole and petiolules stout, grooved above, nearly or quite glabrous, glandless, with a few hooked, strong prickles; the petiolule of the middle leaflet 1 to 1½ in. long, those of the side leaflets over one-half as long, the basal leaflets never sessile.

Old canes. Still erect, pyramidal, the prickles intact. Second year's growth consisting of nearly leafless racemes at the top of the stem, succeeded downward by racemes leafy at the base, and these in turn succeeded by pure leaf branches. Stems of leaf branches irregularly angled, 8 to 12 in. long, more or less pubescent, even woolly on some, prickles small and hooked; leaves 3-foliate at the base of each branch, 5-foliate beyond, resembling those on the new canes, but broader and more pubescent. Racemed branches or fruit branches with a stout axis, irregularly angled, pubescent or woolly, prickles short and recurved; leaves 3-foliate and unifoliate; leaflets very broad and pubescent, coarsely serrate-dentate; about 8 to 12 stout pedicels, very pubescent often woolly with sometimes a stalked gland, set at a moderate angle to the axis, subtended by small bracts; raceme broadest at its top. Naked racemes similar. Flowers large and showy, 1¼ to 1½ in. broad, petals wide, width two thirds of the length, opening the middle of June. Fruit very large short-cylindric, drupelets large and pulpy, sweet; seeds small and unnoticeable. Very productive. Resembles some cultivated kinds. Ripe early in August.

Type station Alstead, N. H., one mile east of Signal Hill. Abundant there and in the elevated parts of Windham County, Vt.

Two other stations where I have found it very abundant and perfect are the lower slopes of Glebe Mt., Londonderry and in South Windham, Vt., though I have found it equally perfect in many other places. It shows its characteristics best in open sun while in moist, rich shade where it grows very tall and leafy its distinguishing features are somewhat obscured.

This blackberry which I have been watching since 1902 closely resembles *some* of those now in cultivation. It is called by the people living where it grows the "square blackberry," and the "short blackberry," in distinction from the "long blackberry" and the "sheep-teat" and "sow-teat," three well-known names for *R. nigrobaccus*, Bailey. In the immediate valley of the Connecticut River where I live, *R. nigrobaccus* is very abundant and is the only "high" blackberry the people know; but as you get away from the river and into more ele-

vated sections it becomes less common and less productive, and berry pickers resort to the square blackberry. This in still more elevated sections becomes scarce and the mountain blackberry, *R. canadensis*, often called the "sour blackberry" is the common kind.

At the type station in Alstead, N. H., *R. pergratus* and *R. nigrobaccus* grow in perfection side by side and the former ripens two weeks the earlier. It is an exact match for the cultivated fruit sold in Bellows Falls, Vt., where it is marketed. With its large drupelets the seeds are hardly noticeable while the fruit of *R. nigrobaccus* with often 100 drupelets is characteristically "seedy," but its peculiarly aromatic taste nevertheless makes it the king of blackberries. I have deposited an abundant supply of specimens of this species in the Gray Herbarium.

Westminster, Vermont.

SOME NEW RECORDS OF MAINE PLANTS.

Ora W. Knight.

Eriophorum polystachion L. In Prof. Fernald's recent article on North American Species of Eriophorum, Rhodora, May, 1905, p. 89, he does not give this species as found southwest of Nova Scotia and New Brunswick, all Maine specimens being referred to the variety *elatius* Bab. Some slender specimens which I collected at Veazie, June 10, 1905, where they were growing in a wet meadow, have been referred to the species by Prof. Fernald thus giving it a place in our flora.

Eriophorum viridi-carinatum fellowsii Fernald. I am able to record this from the second known Maine station, having collected it on a wet springy slope at Charleston, July 4, 1905. This was the only form growing in this locality.

Iva ciliata Willd. This does not appear to be recorded from Maine. Several plants were growing in a dump near Bangor and were collected by Mr. F. M. Billings and myself on October 6, 1905, at which time they were just in bloom.

Ceanothus americanus L. There seem to be no recent records of this plant being collected in Maine. We have known a station by the Penobscot River near Bangor for several years, and July 30, 1905, Mr. Billings found another station for the plant, also on the river-bank some half a mile from the first station.

Heracleum sphondylium L. Mr. Billings and I found lusty plants of this growing in the rear of a warehouse on a wharf along the water front, Bangor, July 8, 1905.

Chenopodium polyspermum L. We collected it in sandy soil at edge of a wharf on the same day as the preceding species.

Galium mollugo L. Very abundant at one station, Bangor.

Andromeda ligustrina Muhl. I collected this on a "floating bog" at Pittsfield which is very near its northeastern limit of distribution in Maine. It is common the other side of the Kennebec River.

Physocarpus opulifolius Maxim. I collected this in a thicket near a brook, June 30, 1905, in Brewer. Years ago Aaron Young collected this, as shown in the Gray Herbarium, on "Banks of streams, Bangor" but we have been unable to find his original station and are rather inclined to believe the plant has been exterminated by cultivation.

Datura stramonium L. Mr. Billings found a few plants in newly deposited ballast along the Maine Central Railroad near Bangor, Aug. 26, 1905.

Bidens beckii Torr. Mr. Billings found one plant in bloom at Pushaw Pond in August, and I collected sterile material later on but could find no flowers. The plants were very numerous in a small sluggish brook.

Sedum acre L. One plant growing by roadside, Bangor, July 16, 1905.

Saponaria vaccaria L. Several plants were collected by Mr. Billings along shore of river, Bangor, July 15, 1905.

With the exception of the *Datura*, *Bidens*, *Saponaria* and *Sedum*, specimens of all the plants have been submitted to Prof. Fernald for verification, and my thanks are due him for his kindness.

Bangor, Maine.

Remarks upon Mr. House's Paper on Pogonia verticillata.— In a recently published paper on Pogonia [1] Mr. H. D. House takes the opportunity of correcting some statements in regard to the underground parts of *Pogonia verticillata*. This author considers the descriptions of the roots, as given in systematic literature "scanty or misleading" and claims the discovery of a "perennial, horizontal rhizome" in this species. He also maintains that "the roots become rootstocks"! The latter observation would, if true, be a most startling discovery, but in regard to the matter Mr. House has certainly mistaken the horizontal roots for rhizomes. What he attempts to describe is quite clearly the occurrence of root-shoots, which have already been described and figured as characteristic of this species as well as of *Pogonia ophioglossoides* and of several other orchids.[2] When Mr. House, furthermore, states that the stem of Medeola, with which this Pogonia often grows associated is green and glabrous, while that of the Pogonia is purplish and covered with a white "tomentum," it is to be pointed out that it is the Pogonia which is glabrous, and the Medeola of which the stem is clothed with flocculent-deciduous wool.— Theo. Holm, Brookland, D. C.

[1] Rhodora, Jan. 1906, p. 19.

[2] Holm Theo.: *Pogonia ophioglossoides* Nutt. A morph. and anat. study. (Am. Journ. Sci., Jan. 1900, p. 13.)

[Some days after the above communication came to hand, corrections of similar import were also received from Mr. House, himself.— Ed.]

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